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None

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ONLINE DATABASES:WPI

(54) **Oil cooler**

(57) A heat pipe 24 has its condensation end 22 in one end tank of an engine cooling liquid radiator 10, and its evaporation end 26 in an oil cooler 28.

Heat pipe

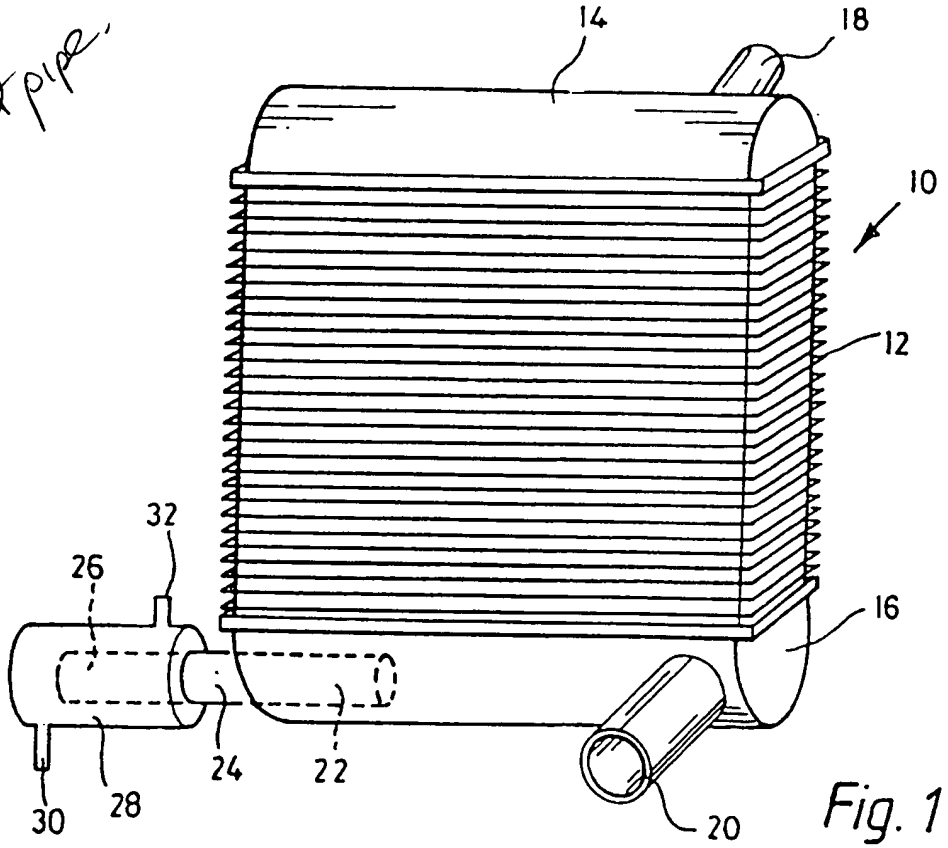

Fig. 1

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

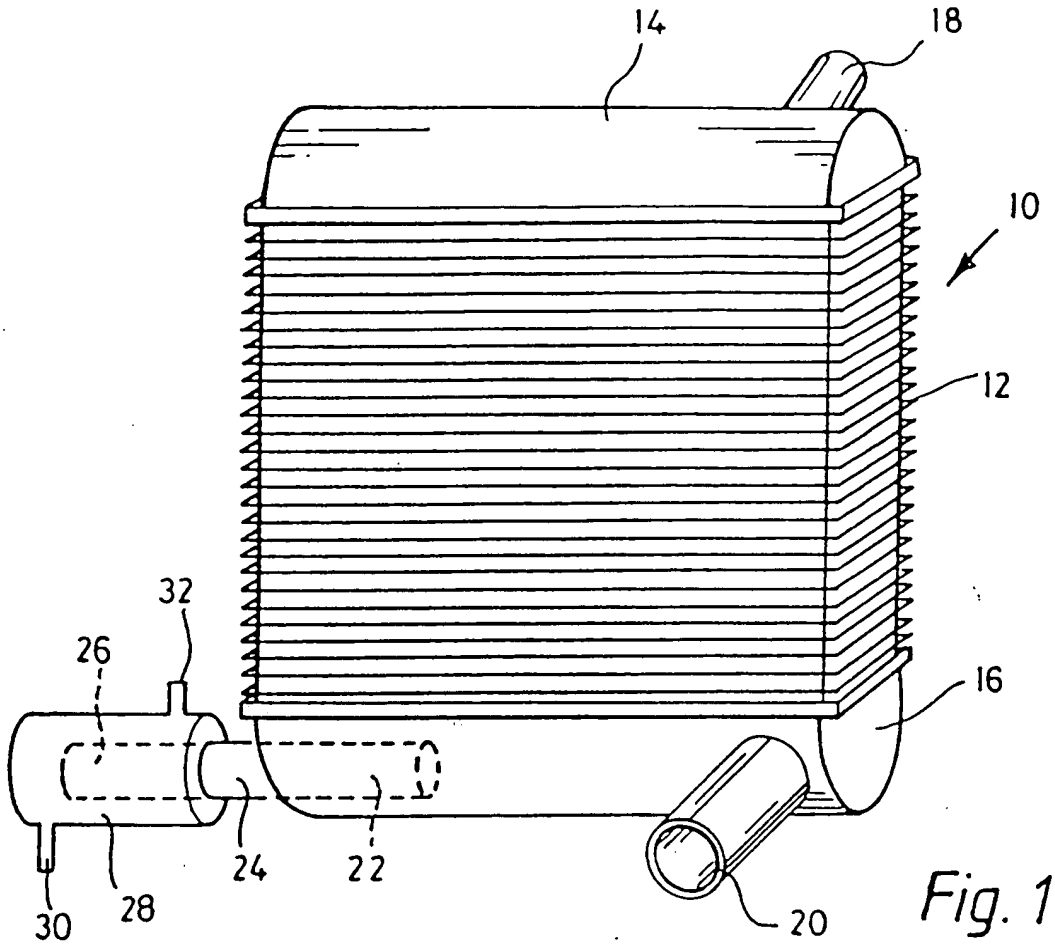

Fig. 1

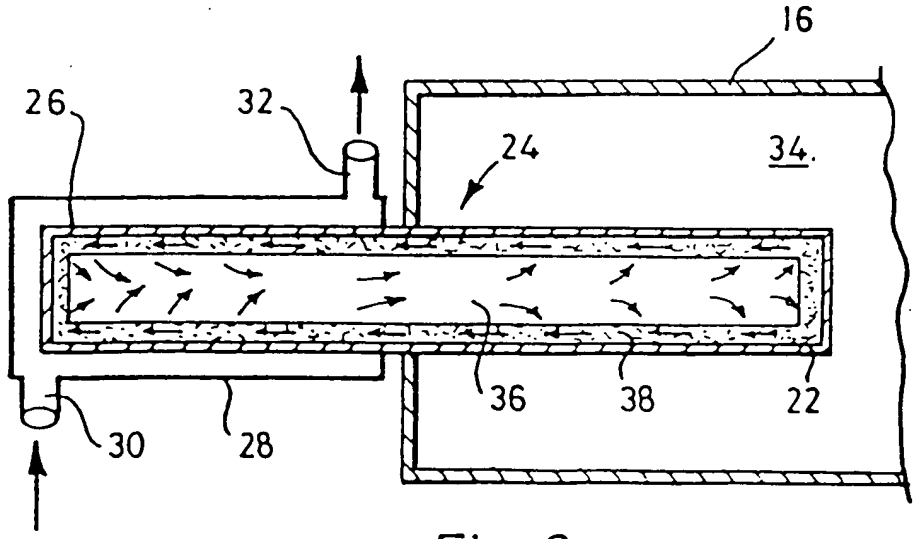

Fig. 2

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FLUID COOLING

This invention relates to a method of cooling a fluid, and to a cooling arrangement for a fluid, where the fluid is an operating fluid used in conjunction with a liquid cooled engine. The invention is particularly, but not exclusively, concerned with cooling operating fluids of motor vehicles.

It is conventional in motor vehicles to cool the engine using a recirculating liquid which is cooled at one part of the circuit before passing through the engine, so that on passing through the engine heat can be extracted from the engine. Cooling of the liquid conventionally takes place in a radiator in heat exchange contact with the air.

This heat exchanger can also be used to cool other operating fluids, for example automatic transmission oil or power steering oil. However when it is necessary to pass some other fluid in heat exchange contact with the cooling liquid, then it becomes necessary to increase the capacity of the cooling liquid circuit or to accept a reduction in performance.

According to the present invention, there is provided a method of cooling of fluid used in association with a liquid-cooled engine, in which method the fluid to be cooled is brought into contact with the evaporation end of a heat pipe and the condensation end of the pipe is located within a cooling liquid chamber forming part of an engine cooling circuit.

The use of a heat pipe to transfer heat between a fluid to be cooled and the cooling liquid circuit results in a lower flow restriction in the cooling liquid circuit than would be the case if the fluid to be cooled was in direct heat

exchange contact with the cooling liquid.

The invention also provides a cooling arrangement for cooling a fluid used in association with a liquid-cooled engine, the arrangement including a heat pipe which has its condensation end located within a cooling liquid chamber forming part of an engine cooling circuit and has its evaporation end in contact with the fluid to be cooled.

The condensation end of the heat pipe is conveniently placed within one header tank of a conventional heat exchange radiator. The evaporation end can conveniently project within a recirculation chamber through which the fluid to be cooled is passed. The recirculation chamber can be connected to an automatic transmission housing, so that automatic transmission oil flows through the recirculation chamber and is thereby cooled.

The invention will now be further described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic view of a cooling arrangement in accordance with the invention; and

Figure 2 is a cross-section through part of the arrangement of Figure 1.

Figure 1 shows a conventional motor vehicle radiator 10 which has a fin and tube core 12 with an upper header tank 14 and a lower header tank 16. The radiator 10 will be connected in a cooling liquid circuit with the cooling liquid entering the radiator through an inlet pipe 18 and leaving it through an outlet pipe 20. The liquid flows through the tubes in the core 12 between the tanks 14 and

16.

Located in the lower header tank 16 is the condensation end 22 of a heat pipe 24. The other, evaporation, end 26 of the heat pipe is located in a recirculation housing 28 which has an inlet 30 and an outlet 32.

Figure 2 shows this arrangement in more detail, with the condensation end 22 of the heat pipe in heat exchange contact with a, cool, fluid 34 inside the lower tank 16. The heat exchange medium 36 inside the heat pipe 24 condenses at the condensation end 22 and is then carried to the evaporation end 26 by a wick 38 which extends the length of the pipe, in a known manner. At the evaporation end 26, the heat exchange medium absorbs heat from the fluid in the recirculation chamber 28 and as a result changes from the liquid state to the vapour state, with the vapour then travelling up the centre of the pipe to the condensation end to pick up its heat. As a result the temperature of the fluid in the recirculation chamber 28 is reduced and that in the lower tank 16 is increased. If desired, either or both of the condensation end 22 and the evaporation end 26 can be provided with fins to enhance the heat transfer performance.

The inlet 30 and the outlet 32 are preferably connected to an automatic transmission casing so that automatic transmission oil can be cooled and returned to the housing. It is aimed to maintain the temperature of the transmission oil at around 120°C or below.

The presence of the condensation end 22 of the heat pipe in the end tank 16 offers relatively little restriction to liquid flow through the tank and therefore does not adversely affect the cooling performance of the engine cooling circuit. Furthermore it is likely that the result

of the arrangement shown will be that the temperature of the oil leaving the outlet 32 will remain substantially uniform during operation and will be less affected by any short term changes of temperature of the cooling liquid passing through the radiator 10. Also, the arrangement described can lead to the possibility of using a smaller radiator than would otherwise be required.

Claims

1. A method of cooling of fluid used in association with a liquid-cooled engine, in which method the fluid to be cooled is brought into contact with the evaporation end of a heat pipe and the condensation end of the pipe is located within a cooling liquid chamber forming part of an engine cooling circuit.

2. A cooling arrangement for cooling a fluid used in association with a liquid-cooled engine, the arrangement including a heat pipe which has its condensation end located within a cooling liquid chamber forming part of an engine cooling circuit and has its evaporation end in contact with the fluid to be cooled.

3. A cooling arrangement as claimed in Claim 2, wherein the condensation end of the heat pipe is placed within one header tank of a conventional heat exchange radiator.

4. A cooling arrangement as claimed in Claim 2 or Claim 3, wherein the evaporation end of the heat pipe projects within a recirculation chamber through which the fluid to be cooled is passed.

5. A cooling arrangement as claimed in Claim 4, wherein the recirculation chamber is connected to an transmission housing, so that automatic transmission oil flows through the recirculation chamber and is thereby cooled.

6. A method of cooling a fluid, substantially as herein described with reference to the accompanying drawing.

7. A cooling arrangement substantially as herein described with reference to the accompanying drawing.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

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Relevant Technical fields

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(ii) Int CL (Edition 5) F28D 15/00, 15/02; F01P 3/00, 3/22, 9/00, 11/08

Search Examiner
A N BENNETT

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

Date of Search
14 JULY 1992

Documents considered relevant following a search in respect of claims 1, 2

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
	NONE	

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SF2(p)

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

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